

STILLWATER

THE FISHERY OF TRUCKEE RIVER AND PYRAMID LAKE, NEVADA

A Preliminary Statement by the Bureau of Sport Fisheries
and Wildlife for Presentation June 12, 1964, to
the Field Task Force, Washoe Project, Mr. Arthur Piper, Chairman

Pyramid Lake, a remnant of ancient Lake Lahontan, was discovered by John C. Fremont in 1844. Geographically, the lake lies approximately 30 miles northeast of Reno in southeastern Washoe County, Nevada. The lake is about 25 miles long and varies in width from 4 to 12 miles; its maximum depth is over 300 feet. In Fremont's time, and before, Pyramid Lake supported untold millions of Lahontan cutthroat trout. The Indians of the area had depended, for hundreds of years, on this trout population for subsistence and for a source of commerce. Other Indians came from as far away as the Great Salt Lake to obtain Pyramid Lake trout for food.

By 1860, Pyramid Lake had become world famous for its huge cutthroat trout. Both sport and commercial fisheries flourished. In those early days, it was not unusual for an individual to catch 100 pounds of fish in two hours of angling if the fish were hitting well. Commercial fishermen flooded the markets of San Francisco and Salt Lake City, as well as the larger Nevada towns, with Pyramid Lake cutthroat. Records from Wells Fargo Company show that nearly 100 tons of trout were shipped from the lake in the six-month period from October 21, 1888, to April 20, 1889.

Fishing in the Truckee River, which Pyramid Lake trout ascended to spawn, also became famous. Spawners were caught by the thousands between Reno, Nevada, and Floriston, California. Below an old dam near Verdi, where trout concentrated to rest during their upstream migration, fishermen were able to spear them with pitchforks. Sometimes, wagonloads of fish were taken in this manner. By the mid 1920's, however, the Pyramid Lake trout population had undergone a pronounced reduction in numbers, and by the late 1930's fish had become alarmingly scarce. By about 1940, long continued subnormal run-off of the Truckee River, steadily increasing diversion of water upstream--particularly at Derby Dam, a feature of the Newlands Project--restriction of spawning fish to the reach below Derby Dam, and virtually uncontrolled exploitation of the spawning runs had combined to eradicate the lake's original native stock of Lahontan cutthroat trout. The last known spawning run of any consequence from the lake occurred in 1938.

It has become evident that inaccessibility of natural spawning areas in the Truckee River was the principal factor responsible for the downfall of the Pyramid Lake trout fishery. Inaccessibility of the spawning areas resulted from a combination of factors: Derby Dam was

constructed without fish facilities for passage and thus prevented fish from using the spawning area above it in the Truckee River, and the reach below gradually became inaccessible from a combination of erosion during spring floods and low flows during the remainder of most years. The continually decreasing flow of the Truckee River into Pyramid Lake over the years has caused a corresponding subsidence of the lake and a greatly-increased gradient in the lower two or three miles of the river (the surface elevation of Pyramid Lake has decreased from a high of 3,879 feet in 1868 to approximately 3,792 feet at present--since 1909, the lake has receded at an average rate of about 1.36 feet a year). Periodic high flows during the spring runoff, combined with the steep gradient in the lower river, have eroded away much of the original streambed and adjacent agricultural lands, and deposited them in a wide alluvial fan at the mouth of the river. Presently, water entering the lake from Truckee River is spread in a wide, thin sheet over this alluvial fan. The shallow water depth, and its high silt content in the spring, prevent fish from moving upstream to spawn.

Coupled with, and aggravated by, the continued subsidence of Pyramid Lake is the subsidiary problem of increasing salinity and alkalinity of the lake water. The concentration of total dissolved solids in Pyramid Lake has increased from 4,700 ppm in 1951 to 5,220 ppm at present. Further decreases in the volume of Pyramid Lake will be accompanied by corresponding increases in the concentration of total dissolved solids until, at some future time, the lake will be an unsuitable environment for trout. For purposes of comparison, the concentration of total dissolved solids in Walker Lake, the other remaining remnant of Lake Lahontan, is approximately 6,800 ppm. Walker Lake supports a substantial population of Lahontan cutthroat trout although it has long since become an unsuitable environment for rainbow trout.

In addition to alkalinity and salinity considerations, and the lack of access to spawning areas, the flow regime in the lower Truckee River is unsuitable for the natural propagation of cutthroat trout. In recent years, flows below Derby Dam have varied from virtually nothing to as much as 19,000 cubic feet per second. The principal difficulty is that flows during the spawning and incubation period are not of sufficient magnitude to cover existing spawning beds or to provide suitable spawning and rearing conditions. On the other hand, high flood flows are also a problem and can be extremely detrimental to fish life. Presumably, however, the frequency and magnitude of flood flows will diminish with further water development upstream.

In the middle and late 1940's, the Nevada Fish and Game Commission, in cooperation with the biological staff of the University of Nevada, began intensive studies of Pyramid Lake aimed at reestablishing the

trout fishery. The studies showed that the productive potential of the lake remained extremely high. Water temperatures, nutrients, and food organisms, were all found to be conducive to rapid fish growth. Subsequently, the Nevada Fish and Game Commission and the Pyramid Lake Indian Tribal Council entered into a formal agreement which provided for their joint management of the Pyramid Lake fishery. The Commission agreed to stock and maintain the fish population of the lake, and the Council agreed to permit public use and to support enforcement of required regulations among Indians and non-Indians alike.

Under terms of an agreement entered into in May 1961, the Commission agreed to stock 5,000 pounds of trout in Pyramid Lake annually. The agreement is to be in effect until May 1976. In July 1961, the Bureau of Sport Fisheries and Wildlife entered into an agreement with the Pyramid Lake Indian Tribal Council whereby the Bureau would stock 10,000 pounds or 50,000 catchable-sized rainbow or cutthroat trout annually. This agreement is to be in effect until December 31, 1966. From the early 1950's to the present time, an average of about 20,000 pounds of trout has been stocked in Pyramid Lake annually. Plantings have consisted mainly of rainbow and cutthroat trout, and until recently have been predominantly rainbow trout. The magnitude of the plantings has been increased to the limit permitted by existing state and Federal hatchery facilities.

To permit evaluation of the fish stocking program, the Nevada Fish and Game Commission has conducted creel checks and fisherman interviews at Pyramid Lake each year since 1954. During the 1954-1963 period, total use-days by Pyramid Lake anglers have varied from slightly less than 20,000 in 1954 to a high of nearly 37,000 in 1959 and have averaged close to 29,000. Catch per angler day during the same period has averaged .44 fish and has ranged from a low of .21 fish in 1954 to a high of .67 fish in 1962. The length of fish caught has averaged a little over 15 inches. Apparently, this relatively large average size and the prospect of catching a 30-inch or larger fish has been enough of an incentive to sustain the fishing pressure even though the catch per unit of effort has been rather poor.

As indicated above, rainbows have made up the bulk of trout stocking for Pyramid Lake until just recently, and this has been reflected in the creel checks. Anglers had consistently caught more rainbows than cutthroats until the 1962-1963 fishing season, when the total trout catch consisted of 81 percent cutthroats.

Returns of stocked rainbow trout have been very poor, averaging only about 10 percent. The greater part of the rainbow catch has consisted of fish that have been in the lake one year or less; few rainbows of

a given plant appear in catches in subsequent years. It appears, therefore, that natural mortality among rainbows, during and after their first year in the lake, is extremely high. In many instances, high mortality has been observed to occur immediately after fish have been released into the lake. This has been attributed partly to the weakened condition of the fish after being hauled the long distance (475 miles) from Hagerman National Fish Hatchery, and partly to the initial shock sustained by introduction into water of high dissolved-solid content. Studies aimed at solution of these problems are now underway and it is hoped that better survival and return of rainbows to the creel may be possible.

Overall results of Lahontan cutthroat trout stocking in Pyramid Lake have been more encouraging. Growth rate and returns to the angler in succeeding years have been much higher than with rainbows. In controlled experiments, Lahontan cutthroats have also displayed a remarkable tolerance to the high alkalinity and salinity of Pyramid Lake water. This is not surprising since the Lahontan cutthroat is native to Pyramid Lake. It is clear that the Lahontan cutthroat will be the mainstay of the Pyramid Lake trout fishery in the future. As noted, the emphasis in stocking has already turned to this species, and it is only a matter of time until no rainbows at all will be stocked in Pyramid Lake.

Pyramid Lake has sufficient surface area to accommodate a fishery of 1,000,000 angler days annually, and its waters are capable of supporting the maximum number of trout that could be expected anywhere outside a fish hatchery. Due to the rapid growth of Pyramid Lake cutthroats, the potential also exists for maximum yields of trophy-sized fish. Although fishing pressure has been relatively light, there is every reason to believe that it would increase markedly with improvement in the quality of the fishery. This assumption is based on known angler response to high-quality fisheries elsewhere, and the upward trend in population growth in the Reno-Sparks area and in California. Thus, it appears that the only factor limiting establishment of an outstanding fishery, aside from increasing alkalinity and salinity, is the fish stock itself, and at the present rate of accumulation of dissolved solids, it is believed a trout fishery can be maintained at Pyramid Lake for many years. The immediate need, then, is a decision on the most practical and economically feasible method of increasing the fish stock.

As indicated, the present stocking program is geared to the productive capacity of existing hatchery facilities. Furthermore, cutthroat eggs are in short supply. Up to now, most of the cutthroats stocked in Pyramid Lake have been hatched and reared at the Hagerman National Fish Hatchery, Idaho, and the Verdi State Hatchery. The eggs have been obtained by the Nevada Fish and Game Commission from Heenan Lake in

California under a cooperative agreement with the California Department of Fish and Game; from Summit Lake on Summit Lake Indian Reservation, Nevada; and from Catnip Reservoir on Sheldon National Wildlife Refuge in northwestern Nevada. A new egg source and additional facilities are urgently needed if appreciable restoration of the fishery is to be accomplished.

Section 4 of the Washoe Project Act states that facilities shall be provided for the development of the fish and wildlife resources of the project area including facilities to permit increased minimum water releases from Lake Tahoe and restoration of the Pyramid Lake fishery. Section 4 states further that the cost to the Federal Government of constructing these facilities shall not exceed \$2,000,000. Minimum water releases from Lake Tahoe are achieved through operation of the existing Prosser Reservoir, an initial feature of the Washoe project. Prosser Reservoir stores water equal in amount to the Lake Tahoe releases and makes it available for downstream demands on Lake Tahoe storage as though it were actually stored in Lake Tahoe. A little less than \$1,500,000 of the total cost of Prosser Reservoir was charged to fish and wildlife development. Thus, only a little over \$500,000 of the amount originally authorized for fish and wildlife development remains for restoration of the Pyramid Lake fishery. It is evident that authorization of additional funds may be required in order to provide facilities contemplated in connection with restoration plans.

The Bureau of Sport Fisheries and Wildlife has proceeded with plans to construct the Lahontan National Fish Hatchery. A tentative site has been selected near Gardnerville, Nevada, and test well drilling is currently in progress. The hatchery, if feasible, will be designed to rear 125,000 pounds of trout annually, of which 50,000 pounds of Lahontan cutthroat will be allocated to Pyramid Lake. Funds for constructing the hatchery will remain separate and apart from Washoe project appropriations.

A plan is now under study to partially restore the fishery of Pyramid Lake through natural propagation in Truckee River. One proposal under consideration would involve a schedule of minimum streamflows, and a fishway extending from the lake to a permanent upstream structure on the river either at Humana Dam or at Marble Bluff which is approximately 3 miles upstream from the lake. The fishway would provide access to the upstream spawning areas by by-passing the unstable delta and the lower several miles of the river. The flows would, of course, have to be of sufficient magnitude to permit proper operation of the fishway and to provide suitable spawning conditions upstream to Derby Dam, and a fish ladder over Derby Dam to permit access to upstream spawning areas could be an ultimate feature of such a plan. Other methods are also under consideration.

Additional studies are now being made of these proposals. Our Bureau is presently engaged in analyzing streamflow, gravel quality, and other data collected during the controlled-flow study of the lower Truckee River in April. Temperature studies of the lower river are in progress and will continue throughout the summer. Our analysis is nearing completion, and we expect to have a report ready for consideration by the Task Force soon.